

CLAIMS

What is claimed is:

1. A system for generating a wireless complementary signal comprising:

an incumbent system configured to format a first signal according to an incumbent protocol;

an overlay system configured to format a second signal according to an overlay protocol; and

a controller configured to overlay the first signal with the second signal to create the wireless complementary signal and to transmit the wireless complementary signal.

2. The system of claim 1 wherein the incumbent system is configured to format the first signal according to a protocol used for an MMDS system.

3. The system of claim 1 wherein the incumbent system comprises a modulator configured to modulate the first signal according to a protocol used for a narrowband signal.

4. The system of claim 1 wherein the overlay system is configured to format the second signal as a CDMA signal.

5. The system of claim 1 wherein the overlay system comprises a modulator configured to modulate the second signal according to a protocol used for a broadband signal.

6. The system of claim 1 further comprising a network device configured to transmit the first signal to the incumbent system.

7. The system of claim 1 wherein the incumbent system is configured to process the first signal using at least one member of a group comprising encryption, de-encryption, compression, decompression, coding, and decoding.

8. The system of claim 1 further comprising a network device configured to transmit the second signal to the overlay system.

9. The system of claim 1 wherein the overlay system is configured to process the second signal using at least one member of a group comprising encryption, de-encryption, compression, decompression, coding, and decoding.

10. The system of claim 1 wherein the controller is configured to transmit a control signal to the incumbent system and, in response thereto, the incumbent system is configured to set a transmission level for the first signal.

11. The system of claim 1 wherein the controller is configured to transmit a control signal to the overlay system and, in response thereto, the overlay system is configured to set a transmission level for the second signal.

12. The system of claim 1 wherein:

the controller is configured to receive an incoming wireless complementary signal and to transmit the incoming wireless complementary signal to the incumbent system and to the overlay system, the wireless complementary signal comprising an incumbent signal portion and an overlay signal portion;

the incumbent system is configured to demodulate the incumbent signal portion; and

the overlay system is configured to demodulate the overlay signal portion.

13. The system of claim 12 further comprising a network device wherein the incumbent system comprises a modulator configured to demodulate the incumbent signal portion, to format the demodulated incumbent signal portion to a third signal receivable by the network device, and to transmit the third signal to the network device.

14. The system of claim 13 wherein the modulator is configured to demodulate the incumbent signal portion according to a protocol used for an MMDS system.

15. The system of claim 12 further comprising a network device wherein the overlay system comprises a modulator configured to demodulate the overlay signal portion, to format the demodulated overlay signal portion to a third signal receivable by the network device, and to transmit the third signal to the network device.

16. The system of claim 15 wherein the modulator is configured to demodulate the overlay signal portion according to a protocol used for a CDMA system.

17. The system of claim 1 wherein the controller is configured to process the incoming wireless complementary signal using at least one member of a group comprising encryption, de-encryption, compression, decompression, coding, and decoding.

18. The system of claim 1 wherein the controller is configured to dynamically determine at least one complementary transmission level for at least one member of a group consisting of the first signal and the second signal.

19. The system of claim 18 wherein the complementary transmission level comprises at least one member of a group comprising a power level, a frequency, and a time slot.

20. The system of claim 1 wherein the controller is configured to transmit a first control signal to the incumbent system identifying a first transmission level for the first signal and to transmit a second control signal to the overlay system identifying a second transmission level for the second signal.

21. The system of claim 1 wherein the controller is configured to transmit a first control signal to the incumbent system identifying a first transmission level for a first new signal and to transmit a second control signal to the overlay system identifying a second transmission level for a second new signal.

22. The system of claim 1 further comprising a carrier sensing system configured to dynamically allocate at least one complementary transmission level for the first signal and the second signal.

23. The system of claim 1 further comprising a MAC entity configured to generate at least one control signal to the incumbent system identifying at least one transmission level for the first signal or to the overlay system identifying at least one other transmission level for the second signal.

24. The system of claim 1 further comprising a MAC entity configured to determine a status of the first signal and the second signal and to generate at least one control signal to the incumbent system or the overlay system identifying at least one transmission level for another signal.

25. The system of claim 1 wherein the incumbent system comprises a variable power controller configured to dynamically obtain capacity from the overlay system for transmission of another signal.

26. The system of claim 1 wherein the overlay system comprises a variable power controller configured to dynamically obtain capacity from the incumbent system for transmission of another signal.

27. A system for generating a wireless complementary signal comprising:

an incumbent system configured to format a first signal according to an incumbent protocol at a first transmission level and to generate the formatted first signal as an incumbent signal;

an overlay system configured to format a second signal according to an overlay protocol at a second transmission level and to generate the formatted second signal as an overlay signal;

a controller configured to overlay the incumbent signal with the overlay signal to create the wireless complementary signal and to transmit the wireless complementary signal; and

a MAC entity configured to determine the first transmission level for the incumbent signal and the second transmission level for the overlay signal, the first transmission level being complementary to the second transmission level.

28. The system of claim 27 wherein the MAC entity comprises a first MAC entity configured to determine the first transmission level and a second MAC entity configured to determine the second transmission level.

29. The system of claim 28 wherein the first MAC entity and the second MAC entity communicate to determine the first transmission level and the second transmission level.

30. The system of claim 28 wherein the first MAC entity is configured to monitor the incumbent system and to process at least one status signal from the second MAC entity to determine the first transmission level.

31. The system of claim 28 wherein the second MAC entity is configured to monitor the overlay system and to process at least one status signal from the first MAC entity to determine the second transmission level.

32. The system of claim 27 wherein the first transmission level comprises at least one member of a group comprising a power level, a frequency, and a time slot.

33. The system of claim 27 wherein the second transmission level comprises at least one member of a group comprising a power level, a frequency, and a time slot.

34. The system of claim 27 wherein the MAC entity is configured to generate a first control signal to the incumbent system identifying the first transmission level and to transmit a second control signal to the overlay system identifying the second transmission level.

35. The system of claim 27 wherein the incumbent system is configured to transmit a first status signal to the MAC entity, the overlay system is configured to transmit a second status signal to the MAC entity, and the MAC entity is configured to determine a third transmission level for at least one member of a group consisting of another incumbent signal and another overlay signal.

36. The system of claim 27 wherein the incumbent system is configured to transmit a first status signal to the MAC entity, the overlay system is configured to transmit a second status signal to the MAC entity, and, in response thereto, the MAC entity is configured to determine at least one member of a group consisting of the first transmission level and the second transmission level.

37. The system of claim 27 wherein the MAC entity is configured to monitor the incumbent system and the overlay system to determine a first status of the incumbent signal and a second status of the overlay signal.

38. The system of claim 27 wherein the incumbent system is configured to modulate the first signal as a narrowband signal, and the overlay system is configured to modulate the second signal as a wideband signal using at least one spreading code.

39. The system of claim 27 wherein the incumbent system comprises an MMDS system configured to modulate the first signal according to a protocol used for MMDS spectrum, and the overlay system comprises a CDMA system configured to modulate the second signal according to a protocol used for a CDMA signal.

40. The system of claim 27 wherein:

the controller is configured to receive an incoming wireless complementary signal and to transmit the incoming wireless complementary signal to the incumbent system and the overlay system, the wireless complementary signal comprising an incumbent signal portion and an overlay signal portion;

the incumbent system is configured to demodulate the incumbent signal portion; and

the overlay system is configured to demodulate the overlay signal portion.

41. The system of claim 40 wherein the MAC entity is configured to estimate at least one incoming transmission level of the incoming wireless complementary signal and to identify the at least one incoming transmission level to the incumbent system and the overlay system.

42. The system of claim 40 comprising a first network device and a second network device wherein the MAC entity is configured to determine signal characteristics of the incoming wireless complementary signal, the incumbent system uses the signal characteristics to format the incumbent signal portion to a first format receivable by the first network device, and the overlay system uses the signal characteristics to format the overlay signal portion to a second format receivable by the second network device.

43. The system of claim 42 wherein the signal characteristics comprise at least one member of a group comprising bandwidth, a spreading code, a modulation scheme, a frequency, a power level, a time slot, a protocol format, encryption, de-encryption, compression, decompression, coding, and decoding.

44. The system of claim 27 wherein the MAC entity is configured to monitor a first status of the incumbent system and a second status of the overlay system and to generate real time status information for the incumbent system and the overlay system to the controller.

45. The system of claim 27 wherein the incumbent system is configured to modulate the first signal at a first predefined, negotiated scheme, and the overlay

system is configured to modulate the second signal at a second predefined, negotiated scheme.

46. The system of claim 27 wherein the incumbent system is configured to modulate the first signal at a first scheme dynamically identified by the controller, and the system is configured to modulate the second signal at a second scheme dynamically identified by the controller.

47. A system for receiving a wireless complementary signal comprising:
- a controller configured to receive the wireless complementary signal and to transmit the wireless complementary signal, the wireless complementary signal comprising an incumbent signal portion and an overlay signal portion;
 - an incumbent system configured to receive the wireless complementary signal from the controller and to demodulate the incumbent signal portion; and
 - an overlay system configured to receive the wireless complementary signal from the controller and to demodulate the overlay signal portion.

48. The system of claim 47 further comprising a network device wherein the incumbent system is configured to format the demodulated incumbent signal portion to a third signal receivable by the network device and to transmit the third signal to the network device.

49. The system of claim 47 wherein the incumbent system comprises a modulator configured to demodulate the incumbent signal portion according to a protocol used for an MMDS system.

50. The system of claim 47 further comprising a network device wherein the overlay system is configured to format the demodulated overlay signal portion to a third signal receivable by the network device and to transmit the third signal to the network device.

51. The system of claim 47 wherein the overlay system comprises a modulator configured to demodulate the incumbent signal portion according to a protocol used for a CDMA system.

52. The system of claim 47 further comprising a MAC entity configured to estimate at least one transmission level of the wireless complementary signal and to identify the at least one transmission level to the incumbent system and the overlay system.

53. The system of claim 47 comprising a first network device, a second network device, and a MAC entity configured to determine signal characteristics of the wireless complementary signal, wherein the incumbent system uses the signal characteristics to format the incumbent signal portion to a first format receivable by the first network device, and the overlay system uses the signal characteristics to format the overlay signal portion to a second format receivable by the second network device.

54. The system of claim 53 wherein the signal characteristics comprise at least one member of a group comprising bandwidth, a spreading code, a modulation scheme, a frequency, a power level, a time slot, a protocol format, encryption, de-encryption, compression, decompression, coding, and decoding.

55. A method for generating a wireless complementary signal comprising:

formatting a first signal according to an incumbent protocol using an incumbent system;

formatting a second signal according to an overlay protocol using an overlay system;

overlaying the first signal with the second signal using a controller to create the wireless complementary signal; and

transmitting the wireless complementary signal.

56. The method of claim 55 further comprising formatting the first signal according to a protocol used for an MMDS system.

57. The method of claim 55 further comprising formatting the second signal as a CDMA signal.

58. The method of claim 55 further comprising transmitting the first signal from a network device.

59. The method of claim 55 further comprising processing the first signal using at least one member of a group comprising encryption, de-encryption, compression, decompression, coding, and decoding.

60. The method of claim 55 further comprising transmitting the second signal from a network device.

61. The method of claim 55 further comprising processing the second signal using at least one member of a group comprising encryption, de-encryption, compression, decompression, coding, and decoding.

62. The method of claim 55 further comprising transmitting a control signal from the controller to the incumbent system and, in response thereto, setting a transmission level for the first signal.

63. The method of claim 55 further comprising transmitting a control signal from the controller to the overlay system and, in response thereto, setting a transmission level for the second signal.

64. The method of claim 55 further comprising:

receiving an incoming wireless complementary signal, the wireless complementary signal comprising an incumbent signal portion and

an overlay signal portion;

demodulating the incumbent signal portion using the incumbent system;

and

demodulating the overlay signal portion using the overlay system.

65. The method of claim 64 further comprising formatting the demodulated incumbent signal portion to a third signal receivable by a network device and transmitting the third signal to the network device.

66. The method of claim 64 further comprising demodulating the incumbent signal portion according to a protocol used for an MMDS system.

67. The method of claim 64 further comprising formatting the demodulated overlay signal portion to a third signal receivable by a network device and transmitting the third signal to the network device.

68. The method of claim 64 further comprising demodulating the overlay signal portion according to a protocol used for a CDMA system.

69. The method of claim 55 further comprising determining at least one complementary transmission level for at least one member of a group consisting of the first signal and the second signal.

70. The method of claim 69 further comprising determining for the complementary transmission level at least one member of a group comprising a power level, a frequency, and a time slot.

71. The method of claim 55 further comprising transmitting a first control signal to the incumbent system identifying a first transmission level for the first signal and transmitting a second control signal to the overlay system identifying a second transmission level for the second signal.

72. The method of claim 55 further comprising transmitting a first control signal to the incumbent system identifying a first transmission level for a first new signal and transmitting a second control signal to the overlay system identifying a second transmission level for a second new signal.

73. The method of claim 55 further comprising dynamically allocating at least one complementary transmission level for the first signal and the second signal using a carrier sensing system.

74. The method of claim 55 further comprising generating from a MAC entity at least one control signal to the incumbent system identifying at least one transmission level for the first signal or to the overlay system identifying at least one other transmission level for the second signal.

75. The method of claim 55 further comprising determining a status of the first signal and the second signal using a MAC entity and generating at least one control signal to the incumbent system or the overlay system identifying at least one transmission level for another signal.

76. The method of claim 55 further comprising dynamically obtaining capacity for the incumbent system from the overlay system for transmission of another signal.

77. The method of claim 55 further comprising dynamically obtaining capacity for the overlay system from the incumbent system for transmission of another signal.

78. A method for generating a wireless complementary signal comprising:

formatting a first signal according to an incumbent protocol at a first transmission level using an incumbent system and generating the formatted first signal as an incumbent signal;

formatting a second signal according to an overlay protocol at a second transmission level using an overlay system and generating the formatted second signal as an overlay signal;

overlaying the incumbent signal with the overlay signal to create the wireless complementary signal using a controller and transmitting the wireless complementary signal; and

determining the first transmission level for the incumbent signal and the second transmission level for the overlay signal using a MAC entity, the first transmission level being complementary to the second transmission level.

79. The method of claim 78 further comprising determining the first transmission level with a first MAC entity and determining the second transmission level with a second MAC entity.

80. The method of claim 78 further comprising monitoring the incumbent system using the first MAC entity and processing at least one status signal from the second MAC entity to determine the first transmission level.

81. The method of claim 79 further comprising monitoring the overlay system with the second MAC entity and processing at least one status signal from the first MAC entity to determine the second transmission level.

82. The method of claim 78 determining the first transmission level comprising at least one member of a group comprising a power level, a frequency, and a time slot and determining the second transmission level comprising at least one member of a group comprising another power level, another frequency, and another time slot.

83. The method of claim 78 further comprising generating a first control signal from the MAC entity to the incumbent system identifying the first transmission level and transmitting a second control signal from the MAC entity to the overlay system identifying the second transmission level.

84. The method of claim 78 further comprising transmitting a first status signal from the incumbent system to the MAC entity, transmitting a second control signal from the overlay system to the MAC entity, and determining a third transmission level at the MAC entity for at least one member of a group consisting of another incumbent signal and another overlay signal.

85. The method of claim 78 further comprising transmitting a first status signal from the incumbent system to the MAC entity, transmitting a second control signal from the overlay system to the MAC entity, and determining a third transmission level at the MAC entity for at least one member of a group consisting of the first transmission level and the second transmission level.

86. The method of claim 78 further comprising modulating the first signal as a narrowband signal and modulating the second signal as a wideband signal using at least one spreading code.

87. The method of claim 78 further comprising modulating the first signal according to a protocol used for an MMDS system and modulating the second signal according to a protocol used for a CDMA signal.

88. The method of claim 78 further comprising:

receiving an incoming wireless complementary signal and transmitting the incoming wireless complementary signal to the incumbent system and the overlay system, the wireless complementary signal comprising an incumbent signal portion and an overlay signal portion;

demodulating the incumbent signal portion at the incumbent system; and demodulating the overlay signal portion at the overlay system.

89. The method of claim 88 further comprising estimating at the MAC entity at least one incoming transmission level of the incoming wireless complementary signal and identifying the at least one incoming transmission level to the incumbent system and the overlay system.

90. The method of claim 88 further comprising determining signal characteristics of the incoming wireless complementary signal, using the signal characteristics to format the incumbent signal portion to a first format receivable by a first network device, and using the signal characteristics to format the overlay signal portion to a second format receivable by a second network device.

91. The method of claim 90 further comprising determining signal characteristics comprising at least one member of a group comprising bandwidth, a spreading code, a modulation scheme, a frequency, a power level, a time slot, a protocol format, encryption, de-encryption, compression, decompression, coding, and decoding.

92. The method of claim 78 further comprising modulating the first signal at a first predefined, negotiated scheme and modulating the second signal at a second predefined, negotiated scheme.

93. The method of claim 78 further comprising modulating the first signal at a first scheme dynamically identified by the controller and modulating the second signal at a second scheme dynamically identified by the controller.

94. A method for receiving a wireless complementary signal comprising:
receiving a wireless complementary signal at a controller and transmitting
the wireless complementary signal, the wireless complementary
signal comprising an incumbent signal portion and an overlay signal
portion;

receiving the wireless complementary signal from the controller at an
incumbent system and demodulating the incumbent signal portion;
and

receiving the wireless complementary signal from the controller at an
overlay system and demodulating the overlay signal portion.

95. The method of claim 94 further comprising formatting the
demodulated incumbent signal portion to a third signal receivable by a network device
and transmitting the third signal to the network device.

96. The method of claim 94 further comprising demodulating the
incumbent signal portion according to a protocol used for an MMDS system.

97. The method of claim 94 further comprising formatting the
demodulated overlay signal portion to a third signal receivable by a network device and
transmitting the third signal to the network device.

98. The method of claim 94 further comprising demodulating the
incumbent signal portion according to a protocol used for a CDMA system.

99. The method of claim 94 further comprising estimating at least one
transmission level of the wireless complementary signal using a MAC entity and

identifying the at least one transmission level to the incumbent system and the overlay system.

100. The method of claim 94 further comprising determining signal characteristics of the wireless complementary signal using a MAC entity, using the signal characteristics to format the incumbent signal portion to a first format receivable by a first network device, and using the signal characteristics to format the overlay signal portion to a second format receivable by a second network device.

101. The method of claim 100 further comprising determining signal characteristics comprising at least one member of a group comprising bandwidth, a spreading code, a modulation scheme, a frequency, a power level, a time slot, a protocol format, encryption, de-encryption, compression, decompression, coding, and decoding.